

## Smoking during pregnancy: Indiana, 1989-2000

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### Abstract

**Objectives** - This report presents trends in smoking during pregnancy in Indiana from 1989 to 2000. Trends and variations in smoking are presented by maternal race/Hispanic origin, age, education, and county of residence and by birth outcome.

**Methods** - Descriptive tabulations of data reported on the birth certificates are presented for Indiana live births. Trends in smoking by maternal age, education, and county of residence are presented in two-year moving average. Birth outcomes according to smoking status of mothers are presented for singleton live births.

**Results** - Prevalence of smoking during pregnancy in Indiana and nationwide has declined during the 1990's. In 1999 in Indiana, 20.9% of all births were to women who smoked during pregnancy compared to 12.3% in U.S. Only three states had a higher smoking rate than Indiana. Throughout the 1989 to 2000 period, the smoking rates declined among non-Hispanic whites, non-Hispanic blacks, and Hispanics, but the rates were consistently highest among non-Hispanic whites and lowest among Hispanics. The decline in smoking was both in rate and in intensity. In 1989, 31% of pregnant smokers in Indiana smoked 20 or more cigarettes per day compared to 24% in 2000. The smoking rate declined among women of all age groups, but the decline was more noticeable among those in their late twenties and early thirties.

Following an initial decline, the smoking rate of pregnant teens increased in recent years among non-Hispanic whites and non-Hispanic blacks. Prevalence of smoking increased with age among non-Hispanic blacks and decreased with age among non-Hispanic whites and Hispanics. However, smoking rates decreased as maternal education increased among both non-Hispanic whites and non-Hispanic blacks.

Smokers were 1.3 times more likely to have a preterm, 2.1 times more likely to have a low birth weight, and 2.4 times more likely to have a small-for-gestational-age (SGA) infant compared to non-smokers. Despite a 26% decline in overall smoking rate among Indiana mothers between 1989 and 2000, SGA births remained unchanged.

**Conclusion** - The recent rise in prenatal smoking rate among Indiana teens and alarmingly high rates in certain counties indicate the need for more educational efforts directed towards the most at risk populations. No improvement in SGA births despite a considerable decline in the self-reported maternal smoking rate may be due partly to an increase in under-reporting of smoking during pregnancy in recent years. Newly revised questions on future birth certificates regarding tobacco use will be more successful in identifying whether, when, and how much a woman smoked during pregnancy.

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## Introduction

Maternal smoking during pregnancy has been associated with low birth weight and fetal growth retardation (1-3), sudden infant death syndrome (4,5), and placental abruption (6). Women who smoke during pregnancy are estimated to be at twice the risk of having a low birth weight baby compared to those who do not smoke. The reduced birth weight is mainly due to intrauterine growth retardation and to a lesser extent to preterm birth (3,7,8). Smoking during pregnancy reduces fetal growth in a dose-dependent manner (1, 9).

Because of the high prevalence of prenatal smoking in Indiana, it must be considered as the most important preventable cause of fetal growth retardation. Despite the declining rate of smoking among pregnant women in US and in Indiana during recent years, Indiana remains one of the top four states in high maternal smoking rate in 1999. The purpose of this report is to examine the trends and patterns of smoking during pregnancy in Indiana from 1989 to 2000. Trends in smoking rates are presented by maternal race/Hispanic origin, age, education, and county of residence. This study examines whether recent changes in the self-reported rate of smoking during pregnancy are reflected in changes in the small-for-gestational-age births in Indiana during this period.

## Methods

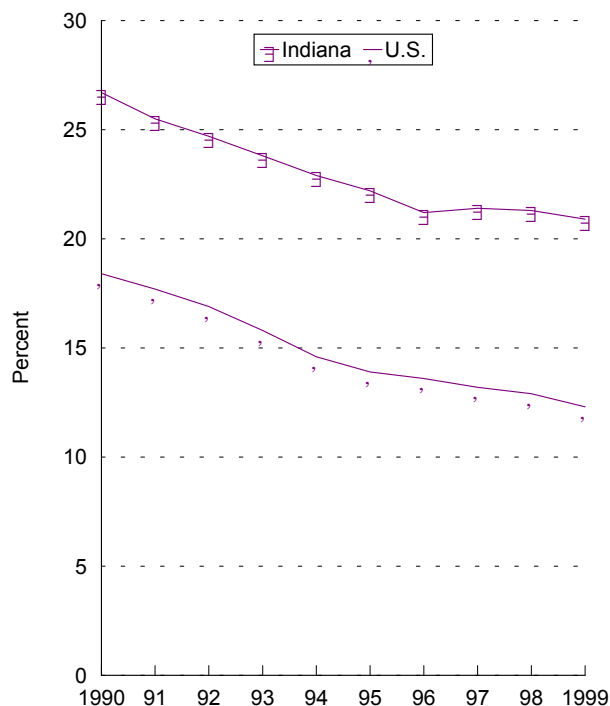
The source of data for this study was the Indiana live birth certificates from 1989 to 2000. Descriptive tabulations of data are reported by race/Hispanic origin, age, and education of mother and by county of residence. The categories used for race/Hispanic origin included non-Hispanic white, non-Hispanic black, and Hispanic. Because more than 99% of blacks in Indiana are non-Hispanic, the results presented for non-Hispanic blacks are almost identical to that of all blacks. Smoking rate according to education of mother was presented in two categories of less than adequate and adequate for mothers less than 20 years of age, and in three categories of less than 12 years, 12 years, and more than 12 years of education for adult mothers. Adequate education for teens was based on appropriate number of grades for her age. The overall prevalence of smoking by race/Hispanic origin is presented on a yearly basis from 1989 to 2000. However, for studying the trend in smoking rates according to age and education of mother and by county of residence, the two-year moving average was used to increase the number of mothers and hence to achieve more stable rates. Percent change in

smoking rate from the beginning to the end of this period was tested for statistical significance. The analysis was restricted to singleton births for comparing the birth outcomes of smokers and non-smokers.

## Results

### Smoking during pregnancy declined in Indiana and nationwide

In 1999, the prevalence of smoking during pregnancy was 20.9% in Indiana compared to 12.3% in U.S. based on data from 46 states (10). Only three states had a higher smoking rate than Indiana. During the 1990's, smoking during pregnancy in the US decreased by 33 percent, from 18.4% in 1990 to 12.3% in 1999, whereas in Indiana, it declined by 22 percent from 26.7% in 1990 to 20.9% in 1999 (Figure 1). In 1990, the smoking rate in Indiana was 45 percent higher than the national average compared to a 70 percent higher rate in 1999. Therefore, despite a decline in smoking during pregnancy in Indiana in the 1990's, the gap between the rates in Indiana and in U.S. has widened. This is largely due to a halt in the downward trend of smoking after 1996 in Indiana while smoking continued to decline nationwide. By 1999, Indiana has not reached the 1990 US rate.



**Figure 1. Prevalence of smoking during pregnancy: Indiana and U.S., 1990-1999 live births**

\*US average excludes California, Indiana, New York State, and South Dakota. From 1991 to 1993 it excludes New York City and in 1990 it excludes New York City and Oklahoma in addition to the above four states.

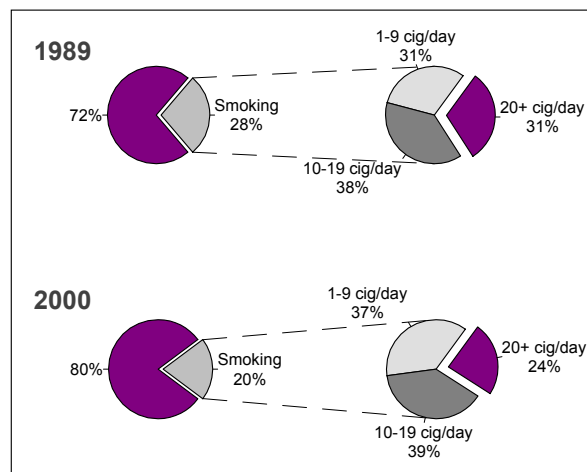
### Smoking declined in both rate and intensity

From 1989 to 2000, smoking rates during pregnancy among Indiana mothers decreased by 26 percent from 27.6% to 20.3%. Most of this decline, however, occurred during the first half of the 1990's. The degree of decline in smoking rate during this period varied by the extent of smoking. Smoking 20 or more cigarettes per day decreased by 43% between 1989 and 2000, whereas smoking 1-10 cigarettes per day declined by 12% (Table 1). In 1989, 31% of pregnant smokers in Indiana smoked 20 or more cigarettes per day compared to 24% in 2000 (Figure 2). Therefore, prenatal smoking in Indiana declined in rate as well as in intensity

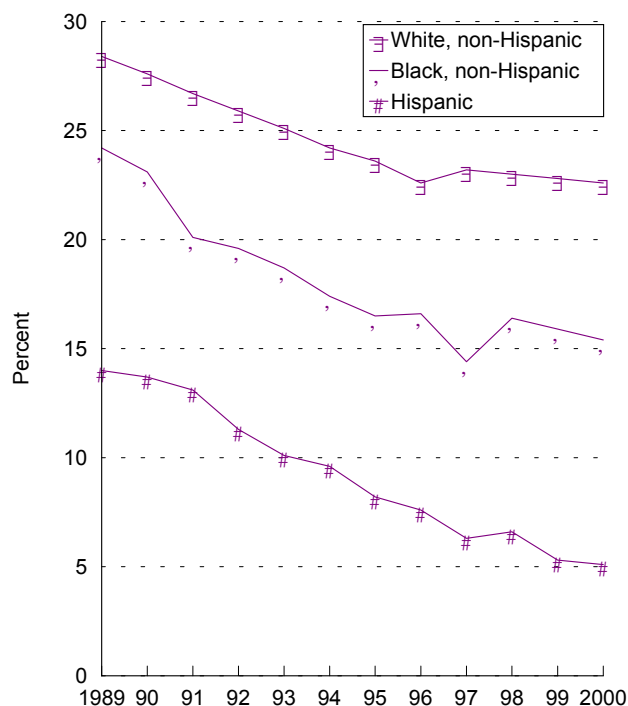
### Smoking rate and intensity varied by race and Hispanic origin

During 1989 to 2000, smoking rates were highest among non-Hispanic whites followed by non-Hispanic blacks and Hispanics (Table 1, Figure 3). In 2000, 22.3% of non-Hispanic white mothers reported smoking during pregnancy compared to 15.4% of non-Hispanic black and 5.1% of Hispanic mothers. From 1989 to 2000, Hispanics had the sharpest decline (by 63%) in their smoking rate compared to the decline among non-Hispanic blacks (by 37%) and non-Hispanic whites (by 22%). Since 1996, the downward trend in the smoking rate came to a halt for non-Hispanic whites, slowed down for non-Hispanic blacks, but continued to decline for Hispanics.

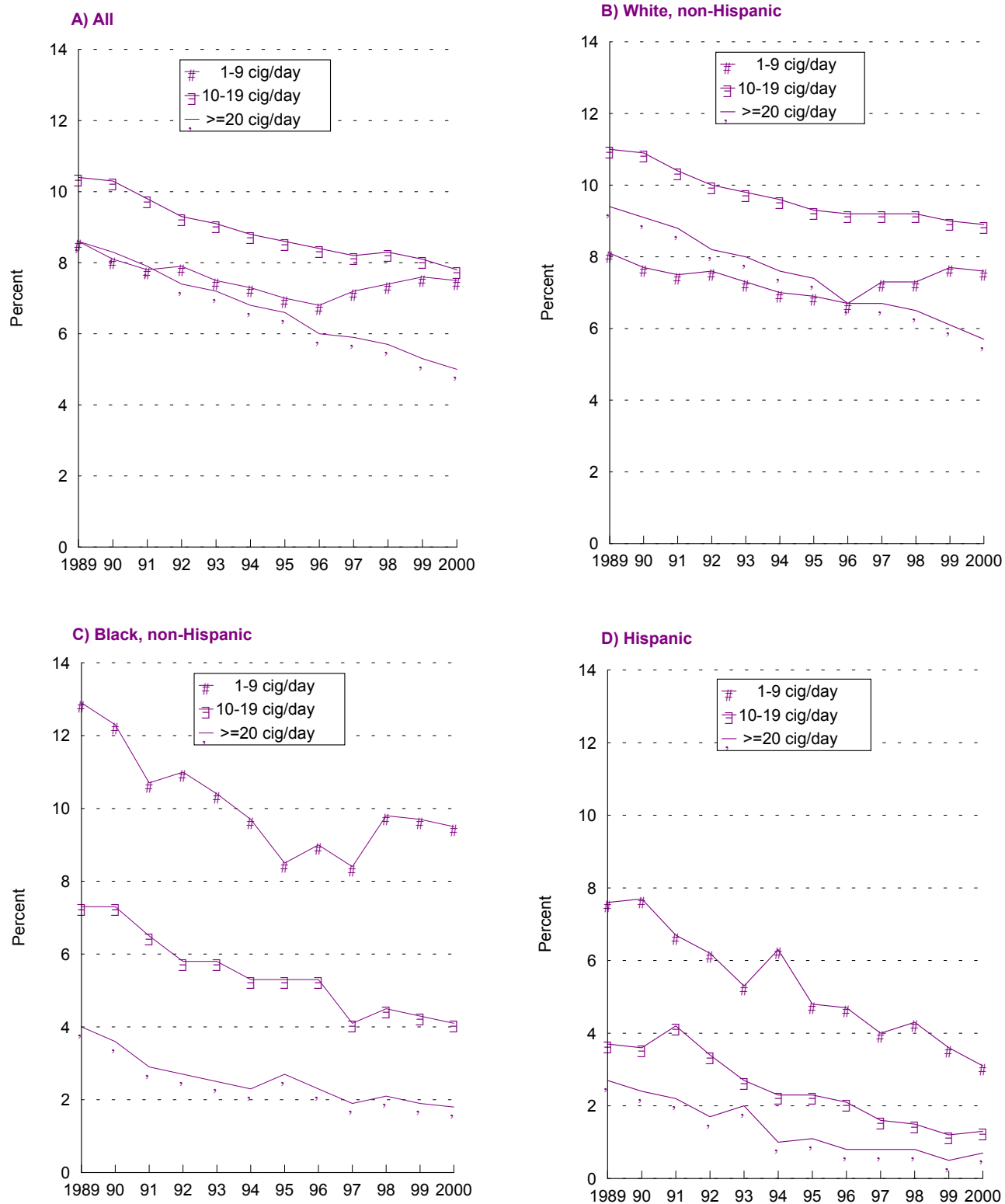
Trend in smoking prevalence also varied by the extent of smoking within each race. During 1989 to 2000, non-Hispanic whites had the highest prevalence of heavy smoking (more than 20 per day) and the smallest degree of decline in heavy smoking compared to non-Hispanic blacks and Hispanics (Table 1, Figure 4). An increase in the prevalence of smoking 1-9 cigarettes per day in the later half of the 1990's was observed among non-Hispanic whites and among non-Hispanic blacks but not among Hispanics. In year 2000, 26% of the non-Hispanic white smokers smoked 20 or more cigarettes per day compared to 12% of the non-Hispanic black smokers and 15% of the Hispanic smokers (Figure 5). The majority of non-Hispanic black and Hispanic smokers smoked less than 10 cigarettes per day (60-62%) compared to 34% of non-Hispanic white smokers. Therefore, non-Hispanic white mothers not only had a higher prevalence of smoking but were also heavier smokers compared to blacks and Hispanics.



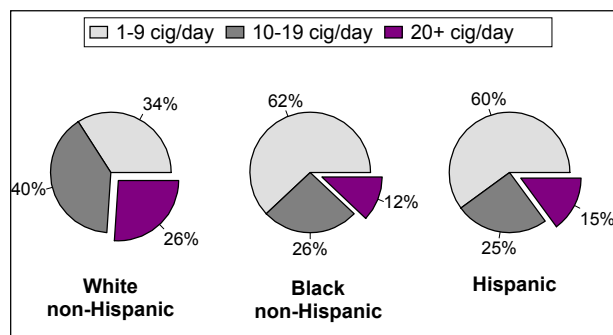
**Figure 2. Smoking prevalence during pregnancy and proportion of smokers according to the number of cigarettes smoked: Indiana, 1989 and 2000 live births**



**Figure 3. Prevalence of smoking during pregnancy by race and Hispanic origin of mother: Indiana, 1989-2000 live births**



**Figure 4. Prevalence of smoking during pregnancy according to the number of cigarettes smoked by race and Hispanic origin: Indiana, 1989-2000 live births**

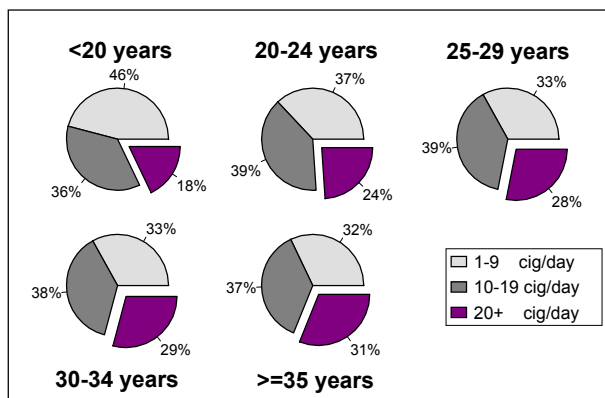


**Figure 5. Proportion of smokers according to the number of cigarettes smoked by race and Hispanic origin of mother: Indiana, 2000 live births**

In the following sections, data are presented in two-year intervals.

### Smoking intensity increased with age

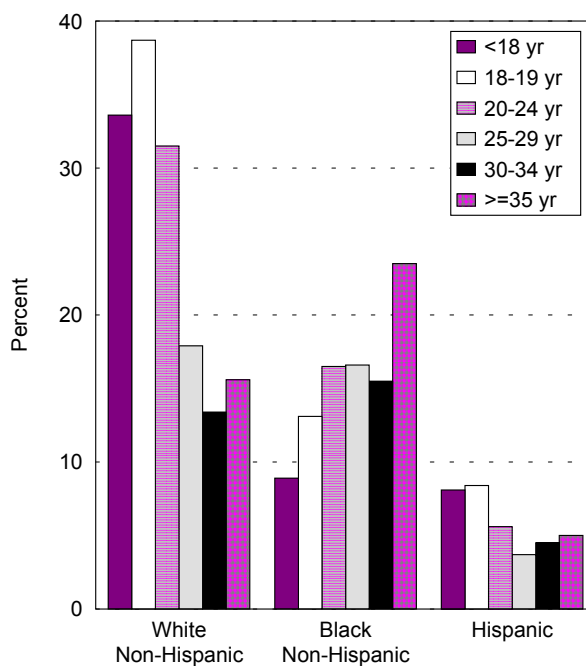
Among all mothers who smoked during pregnancy in year 2000, close to one fourth smoked 20 or more cigarettes per day. This proportion, however, varied not only by race but also by age. The proportion of heavy smokers (20 or more cigarettes per day) increased from 18% among the teen smokers to 31% among the smokers who were 35 years of age or older (Figure 6). Increased intensity of smoking with age occurred in non-Hispanic whites as well as in blacks and Hispanics (data not shown).



**Figure 6. Proportion of smokers according to the number of cigarettes smoked by age of mother: Indiana, 1999-2000 live births**

### Smoking prevalence increased with age among non-Hispanic blacks and decreased with age among non-Hispanic whites

Prevalence of smoking among non-Hispanic whites was highest for older teen mothers, 18-19 years, followed by younger teens and mothers in their early twenties compared to older mothers. In contrast, among non-Hispanic black mothers, the smoking rate was lowest among teens and highest among those 35 years and older (Table 2). During 1999-2000 period, the smoking rate of 37.1% among teen non-Hispanic white mothers was more than double the rate of 15.4% among women 35 years of age and older. Among non-Hispanic blacks, however, the smoking rate of teen mothers (11.5%) was half of the smoking rate of those 35 years and older (23.4%). For Hispanics, the prevalence was considerably lower in all age groups, but the age pattern was somewhat similar to non-Hispanic whites (Table 2, Figure 7).



**Figure 7. Prevalence of smoking during pregnancy by race, Hispanic origin, and age of mother: Indiana, 1999-2000 live births**

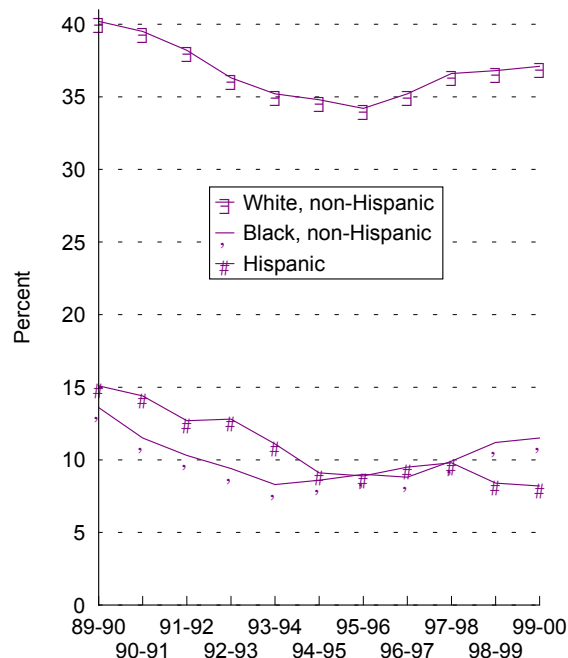
### Recent rise in smoking prevalence among teenagers

Following an 18% decline in prenatal smoking rate among Indiana teenagers between 1989-1990 and 1995-1996, smoking increased by 7% afterwards. Between 1989-1990 and 1995-1996, teen smoking rate during pregnancy decreased by 15% among non-Hispanic whites and by 34% among non-Hispanic blacks whereas between 1995-1996 and 1999-2000, their smoking rates increased by 8% and 28%, respectively. Among Hispanic teens, however, smoking rate declined by 8% after the 1995-1996 period. (Table 2, Figure 8).

### Mothers in their late twenties and early thirties had the largest decline in smoking rate

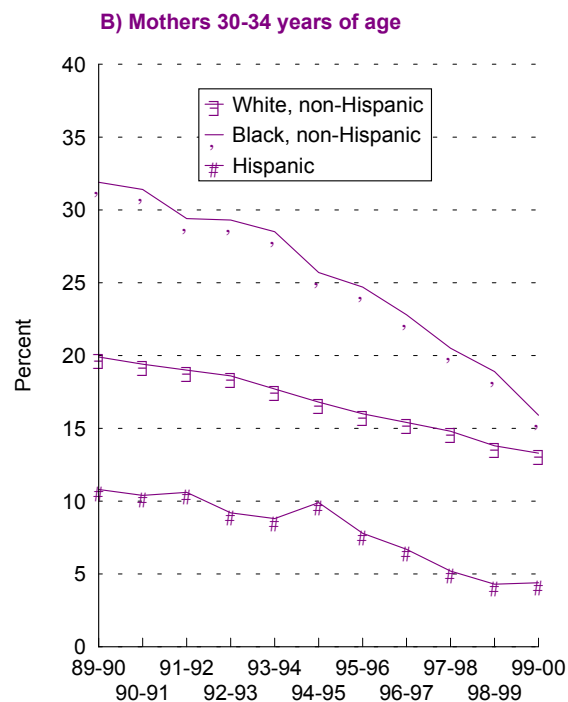
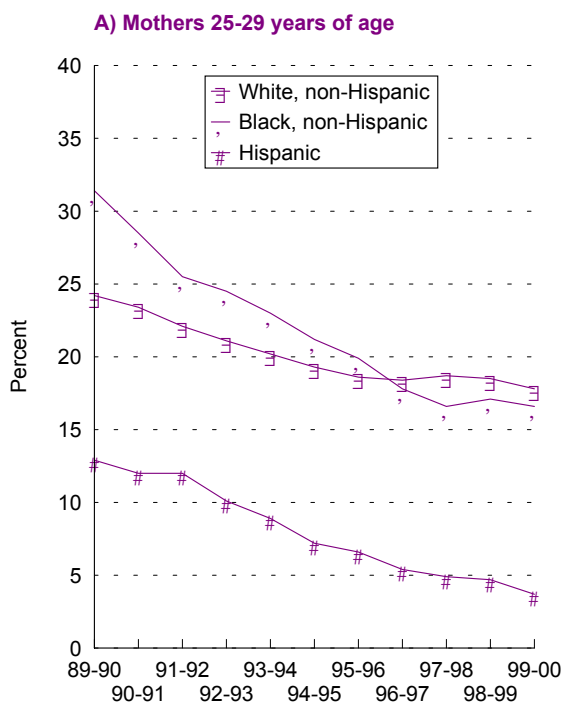
Between 1989-1990 and 1999-2000 in Indiana, the smoking prevalence during pregnancy declined by 17% among mothers in their early twenties compared to a 31% and 37% decline among those in their late twenties and early thirties, respectively (Table 2, Figure 9). Among mothers 35 years of age and older, however, the smoking rate declined only by 13% during this period. This pattern of a noticeable decrease in smoking prevalence among mothers in their late twenties and early thirties and smaller improvement for younger and older mothers was similar among

non-Hispanic whites and blacks. Among Hispanics, the decline in smoking among all adult mothers was sharp and similar, ranging from 56 to 72% in various age groups over this period.



**Figure 8. Prevalence of smoking during pregnancy among mothers less than 20 years of age by race and Hispanic origin: Indiana, 1989-2000 live births**

(Two-year moving average)



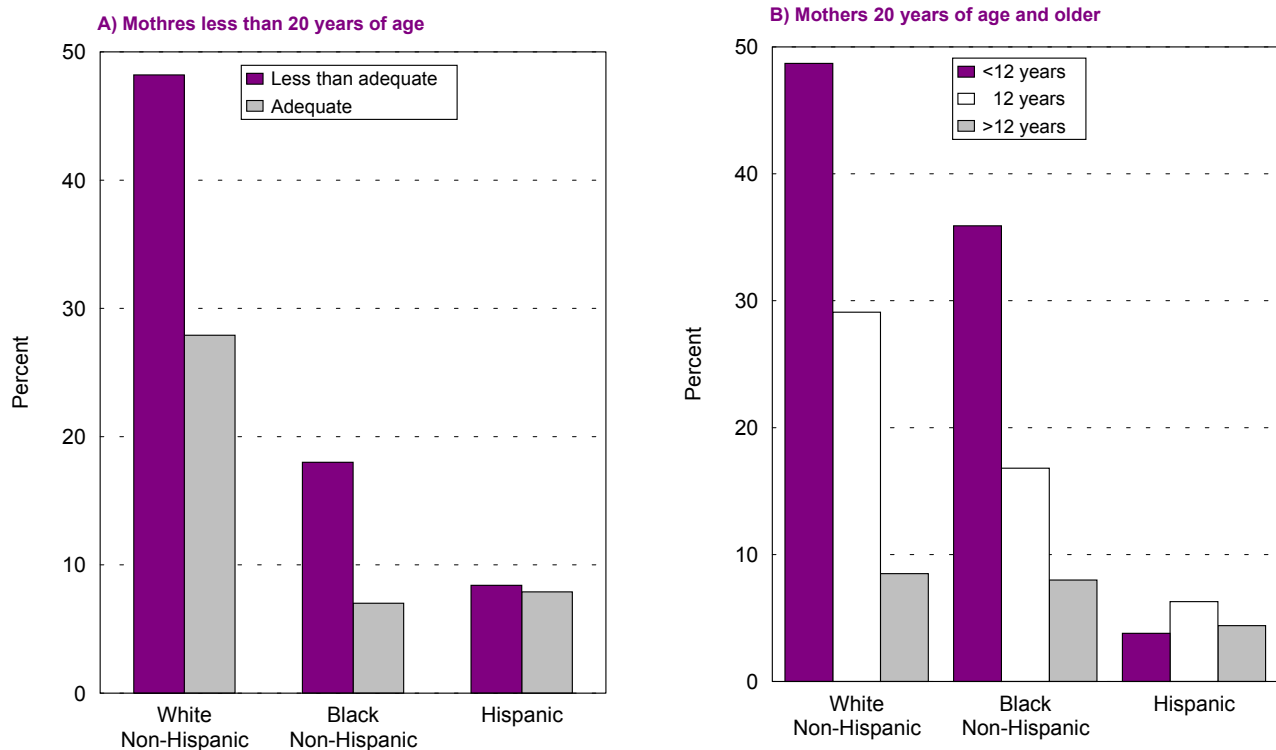
**Figure 9. Prevalence of smoking during pregnancy among mothers 25-29 and 30-34 years of age by race and Hispanic origin: Indiana, 1989-2000 live births**  
(Two-year moving average)

### Smoking prevalence increased as level of education decreased

Smoking rates of teen (less than 20 years of age) and adult women increased as educational level decreased among both non-Hispanic whites and non-Hispanic blacks (Table 3, Figure 10). In 1999-2000, almost half of the non-Hispanic white teens with less than adequate education and adults with less than 12 years of education smoked during pregnancy compared to less than 30% of those with adequate education and 8.5% of those with more than high school education. Among non-Hispanic blacks, more than one third of adult mothers (20 years of age or older) who had not finished high school smoked during pregnancy compared to 8% of their counterparts who had some college education. Among Hispanics, however, there was no specific pattern in smoking rates and education of the mother (Table 3, Figure 10).

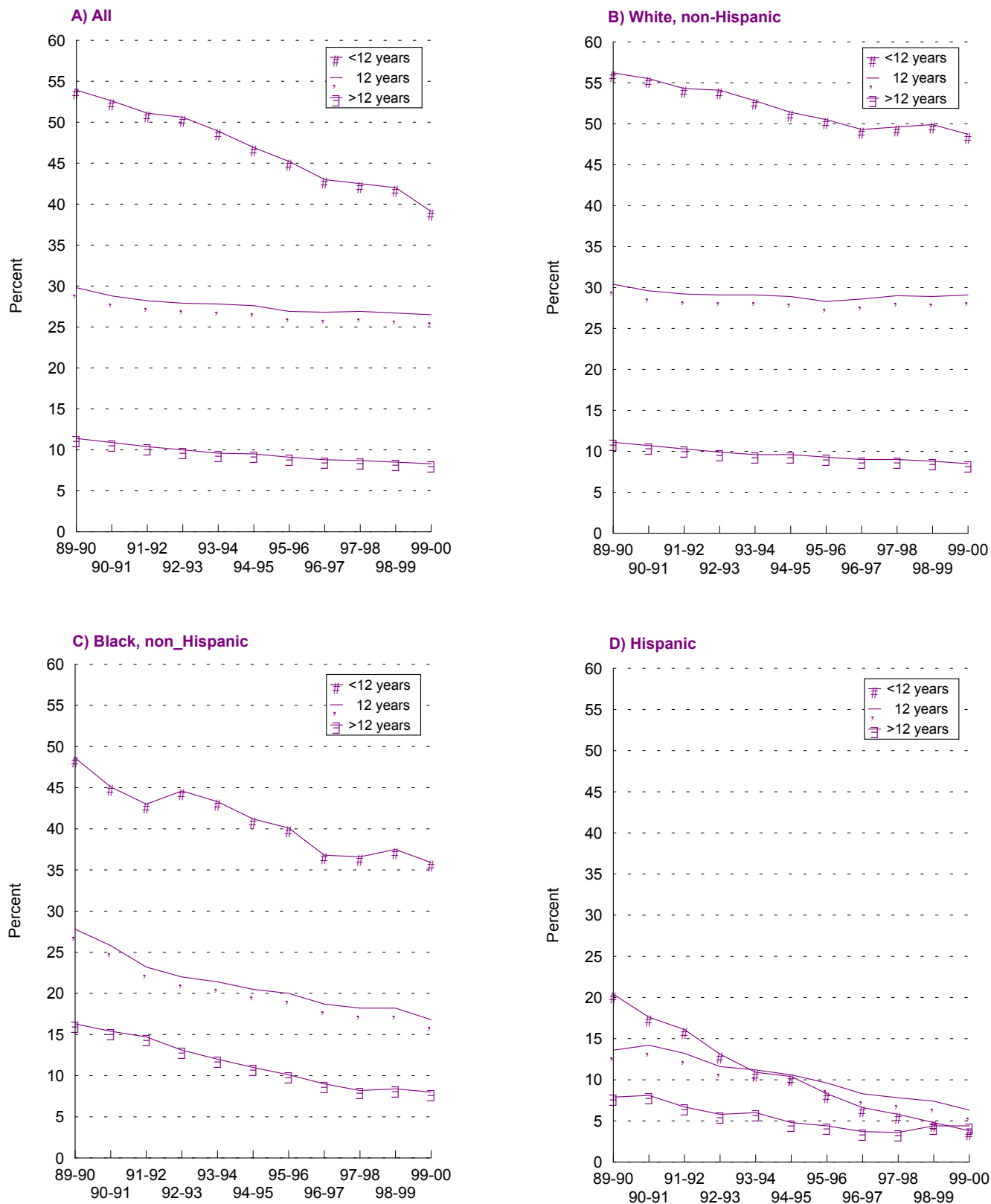
### More educated adult mothers had greater decline in smoking rate

Throughout the 1989 to 2000 period, the smoking rates of mothers 20 years of age and older who had more than a high school education were considerably lower and the decline in rates noticeably sharper than the less educated mothers among both non-Hispanic whites and blacks (Table 3, Figure 11). Among Hispanics, however, the trend was opposite, meaning that the decline in smoking rates was seen to a greater extent among the less educated mothers. During the recent years, almost half of the non-Hispanic white mothers without a high school diploma and 29.1% of those with a high school diploma smoked during pregnancy with little improvement over the last decade. Compared to non-Hispanic whites, blacks had a greater decline in their smoking rates in all educational levels.



**Figure 10. Prevalence of smoking during pregnancy among teen and adult women by education and race and Hispanic origin: Indiana, 1999-2000 singleton live births**





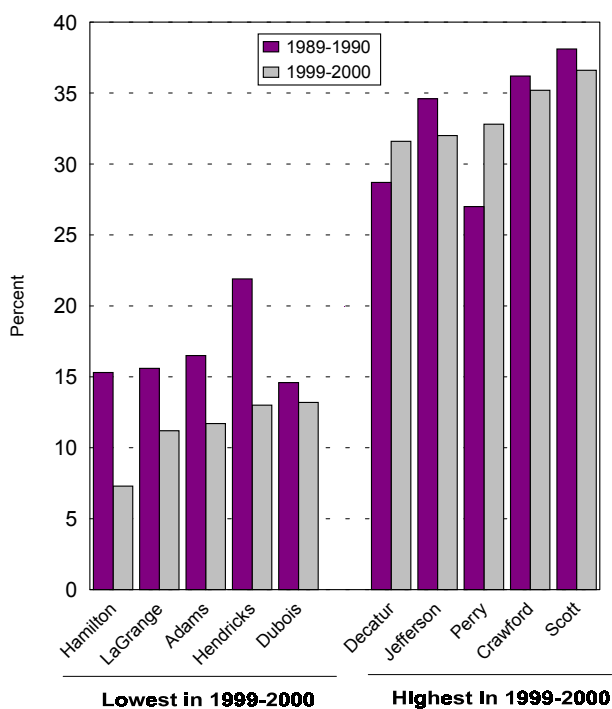
**Figure 11. Prevalence of smoking during pregnancy among mothers 20 years of age and older by years of education and race/Hispanic origin: Indiana, 1989-2000 live births**

(Two-year moving average)



## Smoking During Pregnancy in Indiana Counties

During 1999-2000, prevalence of smoking during pregnancy in Indiana counties ranged from 7.3% to 36.6%. (Table 4). The five counties with the lowest pregnancy smoking rates were Hamilton (7.3%), LaGrange (11.2%), Adams (11.7%), Hendricks (13.0%), and Dubois (13.2%) counties (Figure 12). The smoking rate in these counties (except Dubois) declined significantly by 28-52 % since 1989-1990. The five counties with the highest prevalence of smoking during pregnancy were Scott (36.6%), Crawford (35.2%), Perry (32.8%), Jefferson (32.0%), and Decatur (31.6%) counties. These high rates were not significantly different from the rates in 1989-1990.



**Figure 12. Prevalence of smoking during pregnancy in selected counties: Indiana, 1989-1990 and 1999-2000 live births**

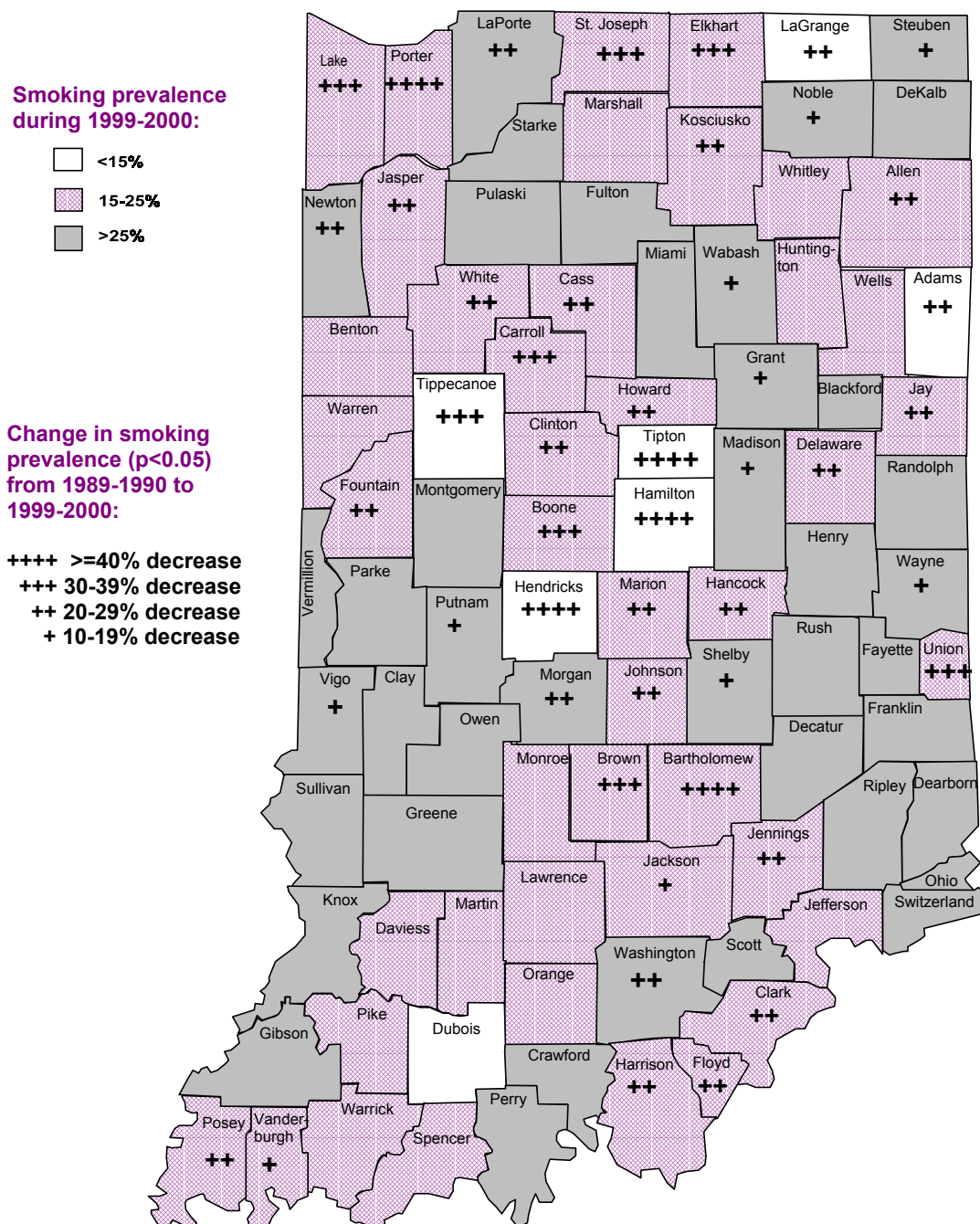
During 1999-2000, pregnancy smoking rate was above 25% in 42 counties, and above 30% in 11 counties compared to 39 and 69 counties, respectively, in 1989-1990 (Table 4). The majority of these counties with very high smoking rates were from the southern half of the state (Figure 13).

From 1989-1990 to 1999-2000, pregnancy smoking rate declined significantly in 48 counties (Table 4). Smoking rate declined by 30-39% in 8 counties (Boone, Carroll, Elkhart, Floyd, Lake, St. Joseph, Tippecanoe, and Union) and by 40% or more in 5 counties (Bartholomew, Hamilton, Hendricks, Porter, and Tipton). There was no significant change in smoking rate in 54 counties, of which 27 had a very high prevalence of smoking (more than 25%) in 1999-2000. In Perry County, smoking rate increased by 21 % between 1989-1990 and 1999-2000 but the difference did not reach the statistical significance.

Table 5 demonstrates the smoking rates during pregnancy by race/Hispanic origin in 15 counties that had more than 5% of live births to black mothers. From 1989-1990 to 1999-2000, smoking rates among black mothers declined significantly by 48-49% in Clark and Lake counties, by 33-36% in St. Joseph and Marion counties, and by 20% in Allen county. Non-Hispanic white mothers in these counties also had significant improvements in their smoking rates but to a lesser extent compared to blacks. There was no remarkable change (less than 10%) in the smoking rates of black mothers in Delaware, Elkhart, Floyd, and Wayne counties; non-Hispanic whites in these counties, however, had a significant decline of 18 to 31% in their smoking rates.

In 1999-2000, one third of black mothers in Wayne county and 19-23% of those in Howard, Delaware, Vanderburgh, Elkhart, Floyd, Vigo, and Grant counties smoked during pregnancy compared to lower rates of 12 to 16% in Lake, Clark, and Marion counties. Among the 15 counties examined, non-Hispanic black mothers had lower smoking rates compared to non-Hispanic whites except in Wayne, Elkhart, and Floyd counties.

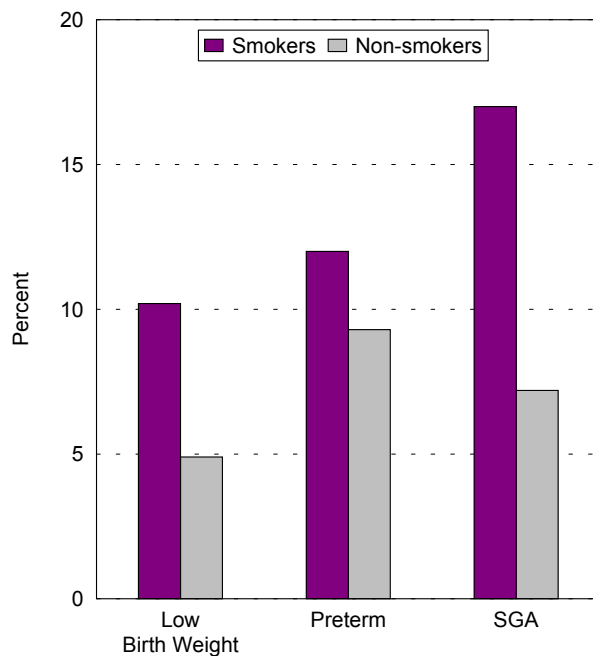
Among all counties examined, only four (Allen, Lake, Marion, and St. Joseph) had stable smoking rates for Hispanic mothers in 1989-1990 and in 1999-2000. Smoking during this period declined by 40% in Lake, by 52% in Allen, and by 70-74% in Marion and St. Joseph counties. In 1999-2000, only 7.1-7.7% of Hispanic mothers in Allen and Lake counties and 3.4-3.9% of those in Marion and St. Joseph counties smoked during pregnancy.



**Figure 13. Smoking during pregnancy in Indiana counties: Prevalence during 1999-2000 and change in prevalence from 1989-1990 to 1999-2000**

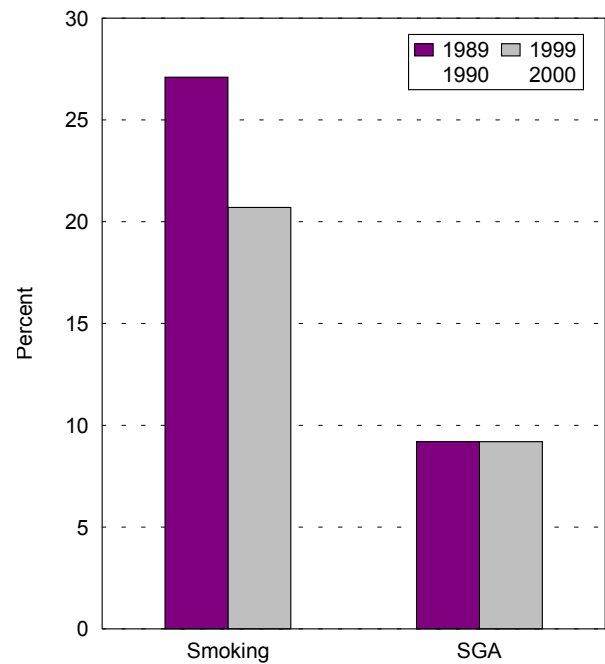
## Smoking during pregnancy and birth outcome

Smoking during pregnancy has been associated with low birth weight and intrauterine growth retardation (1-3). The association of smoking to low birth weight is mainly due to growth retardation and to a lesser extent to preterm birth (3,7,8). Compared to non-smokers in Indiana, mothers who smoked during pregnancy were 2.4 times more likely to have SGA, 2.1 times more likely to have low birth weight, and 1.3 only times more likely to have preterm infants (Table 6, Figure 14).

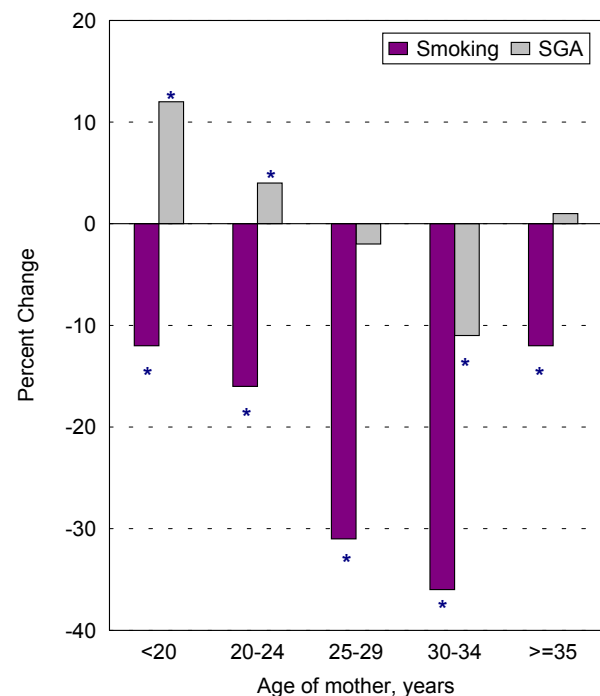


**Figure 14. Birth outcome by smoking status during pregnancy: Indiana, 1999-2000 singleton live births**

Despite an overall decline of 24% in maternal smoking rate in Indiana between 1989-1990 and 1999-2000, the prevalence of SGA births during this period remained unchanged (Table 6, Figure 15). Among non-Hispanic black mothers with a 34% decline in smoking rate throughout this period, SGA births decreased by only 1% and among Hispanics, SGA births declined by only 6% despite a 62% decline in smoking rate. Among mothers less than 20 years of age, SGA birth increased by 12% whereas smoking decreased by 12% during this period. A reduction in SGA births by 11% was observed among mothers 30-34 years of age that had a 36% decline in smoking rate (Table 7, Figure 16).



**Figure 15. Prevalence of smoking during pregnancy and small-for-gestational-age births: Indiana, 1989-1990 and 1999-2000 singleton live births**



**Figure 16. Change in prevalence of smoking during pregnancy and small-for-gestational-age births by age of mother: Indiana, 1999-2000 singleton live births**

\*Significant change ( $p < .05$ )

No improvement in the prevalence of SGA births, despite a considerable decline in self-reported smoking rates during pregnancy may partly be due to under-reporting of smoking during pregnancy. The increased publicity on negative effects of smoking during pregnancy over the last decade may have reduced the validity of self-reported smoking prevalence over time.

### Data quality

Smoking rates based on birth certificate data have been shown to underestimate the true rates during pregnancy (11-12). The questions asked include a yes or no answer to whether the mother smoked during pregnancy and the number of cigarettes smoked; there are no specific time referents. The information collected may come from the prenatal records or from the mother herself after delivery in which case its truthfulness and accuracy can be questioned. A recent study on alternative ways of asking about a mother's smoking habits on birth certificates concluded that information on smoking before and during pregnancy is needed to give a more accurate picture of smoking during pregnancy (13).

### Conclusion

Public health education efforts at national and state levels to increase awareness on the health hazards of smoking in general, and during pregnancy in particular, appear to have helped reduce pregnancy smoking rates in Indiana during the last decade. However, the recent rise in smoking rates during pregnancy among teen mothers and continued high overall rates in many Indiana counties indicate the need for more educational efforts directed towards high risk populations. In this respect, some Indiana counties deserve more attention and can benefit from rigorous intervention and prevention efforts.

Evidence from previous analyses and from the present study indicates that smoking during pregnancy increases the risk of fetal growth retardation. Despite an overall decline of 26% in maternal smoking rate in Indiana between 1989 and 2000, prevalence of SGA births during this period remained unchanged. This may be due partly to increased under-reporting of smoking during pregnancy in recent years. The increased publicity on negative effects of smoking during pregnancy over the last decade may have reduced the validity of self-reported smoking prevalence over time. Recently revised questions on future birth certificates regarding tobacco use will be more successful in identifying whether, when, and how much a woman smoked during pregnancy.

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**Table 1. Prevalence of smoking during pregnancy by race/Hispanic origin of mother and by the number of cigarettes smoked and percent change in smoking prevalence: Indiana, 1989 to 2000 live births**

Race/Hispanic origin	Cigarette smoking			
	All	1-9 cig/day	10-19 cig/day	>=20 cig/day
<b>Total</b>				
1989	27.6	8.6	10.4	8.6
1990	26.7	8.1	10.3	8.3
1991	25.5	7.8	9.8	7.9
1992	24.7	7.9	9.3	7.4
1993	23.8	7.5	9.1	7.2
1994	22.9	7.3	8.8	6.8
1995	22.2	7.0	8.6	6.6
1996	21.2	6.8	8.4	6.0
1997	21.4	7.2	8.2	5.9
1998	21.3	7.4	8.3	5.7
1999	20.9	7.6	8.1	5.3
2000	20.3	7.5	7.8	5.0
Change from 1989 to 2000*	-26	-12	-25	-43
<b>White, non-Hispanic</b>				
1989	28.4	8.1	11.0	9.4
1990	27.6	7.7	10.9	9.1
1991	26.7	7.5	10.4	8.8
1992	25.9	7.6	10.0	8.2
1993	25.1	7.3	9.8	8.0
1994	24.2	7.0	9.6	7.6
1995	23.6	6.9	9.3	7.4
1996	22.6	6.7	9.2	6.7
1997	23.2	7.3	9.2	6.7
1998	23.0	7.3	9.2	6.5
1999	22.8	7.7	9.0	6.1
2000	22.3	7.6	8.9	5.7
Change from 1989 to 2000*	-22	-5	-19	-39
<b>Black, non-Hispanic</b>				
1989	24.2	12.9	7.3	4.0
1990	23.1	12.3	7.3	3.6
1991	20.1	10.7	6.5	2.9
1992	19.6	11.0	5.8	2.7
1993	18.7	10.4	5.8	2.5
1994	17.4	9.7	5.3	2.3
1995	16.5	8.5	5.3	2.7
1996	16.6	9.0	5.3	2.3
1997	14.4	8.4	4.1	1.9
1998	16.4	9.8	4.5	2.1
1999	15.9	9.7	4.3	1.9
2000	15.4	9.5	4.1	1.8
Change from 1989 to 2000*	-37	-26	-45	-55
<b>Hispanic</b>				
1989	14.0	7.6	3.7	2.7
1990	13.7	7.7	3.6	2.4
1991	13.1	6.7	4.2	2.2
1992	11.3	6.2	3.4	1.7
1993	10.1	5.3	2.7	2.0
1994	9.6	6.3	2.3	1.0
1995	8.2	4.8	2.3	1.1
1996	7.6	4.7	2.1	0.8
1997	6.3	4.0	1.6	0.8
1998	6.6	4.3	1.5	0.8
1999	5.3	3.6	1.2	0.5
2000	5.1	3.1	1.3	0.7
Change from 1989 to 2000*	-63	-59	-65	-73

\*All changes from 1989 to 2000 are statistically significant at  $p < .05$ .

**Table 2. Prevalence of smoking during pregnancy by race/Hispanic origin and age of mother and percent change in smoking prevalence: Indiana, 1989 to 2000 live births**

Race/Hispanic origin		All	Age of mother				
			<20 years	20-24 years	25-29 years	30-34 years	>=35 years
Total		Percent					
1989-1990	27.1	34.0	32.8	24.4	20.4	17.6	
1990-1991	26.1	32.8	31.5	23.4	19.8	17.1	
1991-1992	25.1	31.3	30.7	22.0	19.3	17.0	
1992-1993	24.2	29.6	30.1	20.9	18.9	16.9	
1993-1994	23.3	28.6	29.4	20.0	18.0	16.8	
1994-1995	22.5	28.4	28.5	19.0	17.1	17.0	
1995-1996	21.7	28.0	27.4	18.2	16.2	17.0	
1996-1997	21.3	28.7	26.7	17.7	15.4	17.1	
1997-1998	21.4	29.8	27.1	17.8	14.7	16.8	
1998-1999	21.1	29.9	27.5	17.5	13.6	16.4	
1999-2000	20.6	30.1	27.3	16.8	12.9	15.3	
Change 1989-1990 to 1999-2000*	-24	-12	-17	-31	-37	-13	
White, non-Hispanic							
1989-1990	28.0	40.2	34.6	24.2	19.9	17.1	
1990-1991	27.1	39.5	33.5	23.4	19.4	16.5	
1991-1992	26.3	38.2	33.0	22.1	19.0	16.4	
1992-1993	25.5	36.3	32.6	21.1	18.6	16.3	
1993-1994	24.7	35.2	32.1	20.2	17.7	16.0	
1994-1995	23.9	34.8	31.4	19.3	16.8	16.4	
1995-1996	23.1	34.2	30.3	18.6	16.0	16.7	
1996-1997	22.9	35.2	29.9	18.4	15.4	16.9	
1997-1998	23.1	36.6	30.5	18.7	14.8	16.7	
1998-1999	22.9	36.8	31.1	18.5	13.8	16.3	
1999-2000	22.5	37.1	31.4	17.8	13.3	15.4	
Change 1989-1990 to 1999-2000*	-20	-8	-9	-26	-33	-10	
Black, non-Hispanic							
1989-1990	23.7	13.6	23.4	31.4	31.9	27.1	
1990-1991	21.6	11.5	21.2	28.5	31.4	28.6	
1991-1992	19.8	10.3	19.8	25.5	29.4	28.4	
1992-1993	19.2	9.4	19.0	24.5	29.3	28.0	
1993-1994	18.1	8.3	17.4	23.0	28.5	30.0	
1994-1995	16.9	8.6	15.7	21.2	25.7	29.3	
1995-1996	16.5	9.0	15.4	19.9	24.7	27.6	
1996-1997	15.5	8.8	14.7	17.8	22.8	26.1	
1997-1998	15.4	9.9	15.1	16.6	20.5	26.2	
1998-1999	16.1	11.2	16.3	17.1	18.9	26.0	
1999-2000	15.6	11.5	16.1	16.6	15.9	23.4	
Change 1989-1990 to 1999-2000*	-34	-15	-31	-47	-50	-13 **	
Hispanic							
1989-1990	13.8	15.1	16.4	12.9	10.8	11.4	
1990-1991	13.4	14.4	16.6	12.0	10.4	9.4	
1991-1992	12.2	12.7	13.7	12.0	10.6	8.3	
1992-1993	10.7	12.8	10.8	10.1	9.2	9.9	
1993-1994	9.8	11.1	10.2	8.9	8.8	9.8	
1994-1995	8.9	9.1	9.5	7.2	9.9	7.3	
1995-1996	7.8	8.9	8.3	6.6	7.8	6.6	
1996-1997	6.9	9.5	6.8	5.4	6.7	6.4	
1997-1998	6.5	9.8	6.6	4.9	5.2	5.9	
1998-1999	5.9	8.4	6.3	4.7	4.3	5.5	
1999-2000	5.2	8.2	5.3	3.7	4.4	5.0	
Change 1989-1990 to 1999-2000*	-62	-45	-67	-72	-60	-56	

\*All changes from 1989-1990 to 1999-2000 are statistically significant at p<.05 unless indicated.

\*\*Not significant at p<.05.

**Table 3. Prevalence of smoking during pregnancy by race/Hispanic origin and education of mother and percent change in smoking prevalence: Indiana, 1989 to 2000 live births**

Race/Hispanic origin	Education and age of mother				
	<20 years of age		20+ years of age		
	Education not adequate	Education adequate	Education < 12 years	Education 12 years	Education >12 years
Total	Percent				
1989-1990	46.4	23.3	53.9	29.8	11.4
1990-1991	45.3	21.9	52.6	28.8	10.9
1991-1992	43.2	21.0	51.1	28.2	10.4
1992-1993	41.2	19.9	50.6	27.9	10.0
1993-1994	39.7	19.7	48.9	27.8	9.6
1994-1995	38.4	20.5	46.9	27.6	9.5
1995-1996	37.9	20.2	45.2	26.9	9.1
1996-1997	39.0	20.3	43.0	26.8	8.8
1997-1998	39.8	21.6	42.5	26.9	8.7
1998-1999	39.2	22.2	42.0	26.7	8.5
1999-2000	39.1	22.6	39.1	26.5	8.3
Change 1989-1990 to 1999-2000*	-16	-3 **	-27	-11	-27
White, non-Hispanic					
1989-1990	52.6	28.3	56.2	30.4	11.1
1990-1991	51.9	27.4	55.5	29.6	10.7
1991-1992	50.2	26.8	54.3	29.2	10.3
1992-1993	48.3	25.4	54.1	29.1	9.9
1993-1994	47.3	25.0	52.8	29.1	9.6
1994-1995	47.2	25.5	51.4	28.9	9.6
1995-1996	46.6	24.9	50.5	28.3	9.3
1996-1997	47.1	25.2	49.3	28.6	9.0
1997-1998	48.0	26.9	49.6	29.0	9.0
1998-1999	47.8	27.6	49.9	28.9	8.8
1999-2000	48.2	27.9	48.7	29.1	8.5
Change 1989-1990 to 1999-2000*	-8	-1 **	-13	-4	-23
Black, non-Hispanic					
1989-1990	20.2	9.6	48.6	27.8	16.3
1990-1991	18.2	7.4	45.1	25.8	15.4
1991-1992	17.7	5.7	43.0	23.2	14.7
1992-1993	16.6	4.8	44.6	22.0	13.1
1993-1994	14.3	4.5	43.3	21.4	12.0
1994-1995	13.9	5.3	41.2	20.5	11.0
1995-1996	14.1	5.8	40.1	20.0	10.1
1996-1997	13.5	5.7	36.8	18.7	9.0
1997-1998	15.9	5.8	36.6	18.2	8.2
1998-1999	18.1	6.3	37.5	18.2	8.4
1999-2000	18.0	7.0	35.9	16.8	8.0
Change 1989-1990 to 1999-2000*	-11 **	-27	-26	-40	-51
Hispanic					
1989-1990	21.3	9.1	20.4	13.6	7.9
1990-1991	19.0	10.0	17.6	14.2	8.1
1991-1992	14.9	10.6	16.1	13.2	6.7
1992-1993	16.5	8.9	13.1	11.6	5.8
1993-1994	14.7	6.8	10.9	11.2	6.0
1994-1995	10.9	7.1	10.4	10.6	4.8
1995-1996	9.5	8.1	8.3	9.6	4.4
1996-1997	10.4	8.3	6.6	8.3	3.7
1997-1998	10.9	8.3	5.8	7.8	3.6
1998-1999	8.0	8.7	4.8	7.4	4.4
1999-2000	8.4	7.9	3.8	6.3	4.4
Change 1989-1990 to 1999-2000*	-61	-13 **	-81	-53	-44

\*All changes from 1989-1990 to 1999-2000 are statistically significant at  $p < .05$  unless indicated.

\*\*Not significant at  $p < .05$ .



**Table 4. Prevalence of smoking during pregnancy in 1989-1990 and in 1999-2000 and percent change from 1989-1990 to 1999-2000 by county: Indiana live births**

Counties	1989-1990	1999-2000	Percent change
	Percent	Percent	1989-1990 to 1999-2000
Adams	16.5	11.7	-29 *
Allen	23.2	17.8	-23 *
Bartholomew	30.7	16.7	-45 *
Benton	28.4	22.4	-21
Blackford	33.5	30.1	-10
Boone	21.6	15.2	-30 *
Brown	26.9	20.3	-25 *
Carroll	23.7	16.0	-32 *
Cass	31.7	23.2	-27 *
Clark	31.4	22.9	-27 *
Clay	25.8	28.3	10
Clinton	28.8	20.9	-28 *
Crawford	36.2	35.2	-3
Daviess	17.7	20.4	15
Dearborn	26.1	25.5	-2
Decatur	28.7	31.6	10
DeKalb	30.7	30.5	-1
Delaware	30.1	24.0	-20 *
Dubois	14.6	13.2	-10
Elkhart	26.2	18.1	-31 *
Fayette	31.0	28.5	-8
Floyd	31.6	22.1	-30 *
Fountain	32.1	25.3	-21 *
Franklin	24.2	23.1	-5
Fulton	31.7	28.2	-11
Gibson	26.3	25.3	-4
Grant	34.3	29.3	-15 *
Greene	23.4	26.1	12
Hamilton	15.3	7.3	-52 *
Hancock	23.3	17.5	-25 *
Harrison	30.4	22.8	-25 *
Hendricks	21.9	13.0	-41 *
Henry	28.2	26.4	-7
Howard	28.6	21.1	-26 *
Huntington	28.2	24.7	-13
Jackson	29.0	25.0	-14 *
Jasper	28.5	22.8	-20 *
Jay	23.7	18.6	-22 *
Jefferson	34.6	32.0	-8
Jennings	34.7	24.6	-29 *
Johnson	24.6	19.1	-22 *
Knox	31.8	31.1	-2
Kosciusko	25.3	20.3	-20 *
LaGrange	15.6	11.2	-28 *
Lake	26.1	16.0	-38 *
LaPorte	33.0	25.3	-23 *
Lawrence	24.7	24.9	1
Madison	32.9	26.5	-19 *

**Table 4. Percent of mothers who smoked during pregnancy in 1989-1990 and in 1999-2000 and percent change from 1989-1990 to 1999-2000 by county: Indiana live births, Cont.**

Counties	1989-1990	1999-2000	Percent change
	Percent	Percent	1989-1990 to 1999-2000
Marion	28.1	20.5	-27 *
Marshall	24.2	21.5	-11
Martin	26.8	20.9	-22
Miami	26.4	29.6	12
Monroe	19.5	19.3	-1
Montgomery	32.3	29.4	-9
Morgan	33.4	25.6	-23 *
Newton	39.4	28.9	-27 *
Noble	30.4	25.7	-15 *
Ohio	27.0	30.3	12
Orange	28.0	24.8	-11
Owen	31.3	30.8	-2
Parke	30.5	29.6	-3
Perry	27.0	32.8	21
Pike	26.3	24.1	-8
Porter	28.7	17.3	-40 *
Posey	26.2	20.9	-20 *
Pulaski	30.5	25.8	-15
Putnam	31.4	25.9	-18 *
Randolph	24.8	26.7	8
Ripley	25.2	27.0	7
Rush	32.2	26.6	-17
St. Joseph	25.8	16.5	-36 *
Scott	38.1	36.6	-4
Shelby	34.3	29.4	-14 *
Spencer	22.1	21.0	-5
Starke	32.1	30.1	-6
Steuben	31.9	25.9	-19 *
Sullivan	24.8	27.1	9
Switzerland	32.0	28.6	-11
Tippecanoe	21.7	13.8	-37 *
Tipton	25.5	14.9	-42 *
Union	33.9	22.8	-33 *
Vanderburgh	27.5	24.5	-11 *
Vermillion	31.4	28.7	-9
Vigo	30.8	27.0	-12 *
Wabash	33.2	27.2	-18 *
Warren	25.3	19.9	-21
Warrick	21.7	19.1	-12
Washington	37.2	28.1	-24 *
Wayne	33.5	27.4	-18 *
Wells	22.7	20.5	-10
White	30.5	22.7	-25 *
Whitley	24.8	21.7	-13
<b>Total</b>	<b>27.1</b>	<b>20.6</b>	<b>-24 *</b>

\*Significant at  $p < .05$

**Table 5. Prevalence of smoking during pregnancy in 1989-1990 and in 1999-2000 in selected counties and percent change from 1989-1990 to 1999-2000 by race/Hispanic origin of mother: Indiana live births<sup>1</sup>**

Counties	1989-1990	1999-2000	Percent change
	Percent	Percent	1989-1990 to 1999-2000
Allen			
White, non-Hispanic	23.9	19.3	-19 *
Black, non-Hispanic	21.1	16.9	-20 *
Hispanic	14.8	7.1	-52 *
Clark			
White, non-Hispanic	31.8	24.2	-24 *
Black, non-Hispanic	25.8	13.4	-48 *
Hispanic	--	--	...
Delaware			
White, non-Hispanic	31.2	24.7	-21 *
Black, non-Hispanic	20.5	19.4	-5
Hispanic	--	--	...
Elkhart			
White, non-Hispanic	27.0	21.4	-21 *
Black, non-Hispanic	23.9	22.0	-8
Hispanic	--	2.2	...
Floyd			
White, non-Hispanic	32.3	22.1	-31 *
Black, non-Hispanic	25.7	22.3	-13
Hispanic	--	--	...
Grant			
White, non-Hispanic	35.6	30.6	-14 *
Black, non-Hispanic	26.8	23.3	-13
Hispanic	--	--	...
Howard			
White, non-Hispanic	29.1	22.1	-24 *
Black, non-Hispanic	22.8	18.6	-18
Hispanic	--	--	...
Lake			
White, non-Hispanic	29.7	21.3	-28 *
Black, non-Hispanic	24.0	12.2	-49 *
Hispanic	12.9	7.7	-40 *
LaPorte			
White, non-Hispanic	35.0	27.6	-21 *
Black, non-Hispanic	23.5	18.3	-22
Hispanic	--	--	...
Madison			
White, non-Hispanic	34.6	28.2	-18 *
Black, non-Hispanic	20.9	15.7	-25
Hispanic	--	--	...
Marion			
White, non-Hispanic	30.0	24.8	-17 *
Black, non-Hispanic	24.2	15.5	-36 *
Hispanic	11.0	3.4	-70 *
St. Joseph			
White, non-Hispanic	26.7	18.4	-31 *
Black, non-Hispanic	24.5	16.5	-33 *
Hispanic	15.0	3.9	-74 *
Vanderburgh			
White, non-Hispanic	28.0	25.6	-9 *
Black, non-Hispanic	25.0	21.2	-15
Hispanic	--	--	...
Vigo			
White, non-Hispanic	32.1	27.7	-14 *
Black, non-Hispanic	18.8	23.5	25
Hispanic	--	--	...
Wayne			
White, non-Hispanic	33.8	27.7	-18 *
Black, non-Hispanic	30.3	33.0	9
Hispanic	--	--	...

-- Unreliable; based on fewer than 20 births in the numerator.

... Not applicable

\*Significant at p<.05.

<sup>1</sup> Counties with more than 5 percent of all births to black mothers were selected.

**Table 6. Percent preterm, low birth weight, and small-for-gestational-age births by smoking status, race, and Hispanic origin of mother: Indiana, 1999-2000 singleton live births**

Race/Hispanic origin	All Births	Smoking status		Ratio of smokers to non-smokers
		Smoker	Non-smoker	
<b>Total</b>		Percent		
Preterm	9.9	12.0	9.3	1.3
Low birth weight	6.0	10.2	4.9	2.1
SGA (IUGR) <sup>1</sup>	9.2	17.0	7.2	2.4
<b>White, non-Hispanic</b>				
Preterm	9.2	11.3	8.5	1.3
Low birth weight	5.4	9.7	4.1	2.4
SGA (IUGR)	8.4	16.4	6.0	2.7
<b>Black, non-Hispanic</b>				
Preterm	15.5	20.1	14.7	1.4
Low birth weight	11.1	16.9	10.0	1.7
SGA (IUGR)	15.6	23.7	14.0	1.7
<b>Hispanic</b>				
Preterm	9.5	8.4	9.5	0.9
Low birth weight	4.9	7.4	4.8	1.5
SGA (IUGR)	8.6	14.7	8.3	1.8

<sup>1</sup>Small-for-Gestational-Age (Intra Uterine Growth Retardation)

**Table 7. Prevalence of small-for-gestational age births by race/Hispanic origin and age of mother and percent change in prevalence over time: Indiana, 1989-1990 to 1999-2000 singleton live births**

Race/Hispanic origin	All Births	Age of mother				
		<20 years	20-24 years	25-29 years	30-34 years	>=35 years
<b>Total</b>		Percent				
1989-1990	9.2	12.3	10.3	8.0	7.4	7.7
1999-2000	9.2	13.8	10.7	7.9	6.6	7.7
Change from 1989-1990 to 1999-2000	0	12 *	4	-2	-11 *	1
<b>White, non-Hispanic</b>						
1989-1990	8.4	11.4	9.5	7.4	6.8	7.1
1999-2000	8.4	12.8	10.0	7.3	5.9	7.1
Change from 1989-1990 to 1999-2000	0	13 *	5 *	-1	-12 *	0
<b>Black, non-Hispanic</b>						
1989-1990	15.7	15.7	16.4	15.3	15.2	13.1
1999-2000	15.6	18.8	15.4	13.8	13.4	16.2
Change from 1989-1990 to 1999-2000	0	20 *	-6	-10	-12	23
<b>Hispanic</b>						
1989-1990	9.1	12.4	9.5	7.7	6.7	11.2
1999-2000	8.6	10.9	9.3	7.6	7.1	6.6
Change from 1989-1990 to 1999-2000	-6	-13	-1	-2	7	-41 *

\*Significant at p<.05.

## Contents

Abstract.....	1
Introduction.....	2
Methods .....	2
Results.....	2
References.....	12
Tables.....	14

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